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ARTICLE III.

REMARKS

ON THE MODE OF APPLYING

THE ELECTRIC TELEGRAPH

IN CONNECTION WITH

THE CHINESE LANGUAGE.

BY

WILLIAM A. MACY.

(Read October 22, 1851.)

REMARKS

ON THE MODE OF

APPLYING THE ELECTRIC TELEGRAPH

IN CONNECTION WITH

THE CHINESE LANGUAGE.

Two small volumes written in Chinese and printed in China, have been recently received from that country, and are offered to the Library of the Society. These volumes, though possessing no great literary claims, are interesting as evidence that the advanced state of science and art in the West is brought to the hands of the population of China in a popular and intelligible form; and one of them, as breaking new ground with reference to the language of that people. They are: 1. *A Treatise on Astronomy,* by B. Hobson, M. D., and 2. *The Philosophical Almanac*, by D. J. Mac Gowan, M. D.

The first of these works is a simple, elementary treatise on that science; it claims, of course, no merits beyond that of accuracy, and that of furnishing the latest information on the points discussed. But even the humblest production having this recommendation, in a land where knowledge stagnates for centuries, and where novelties are centuries old, is deserving of favorable mention.

But, in another point of view, this work has some interest to us. In the typographical execution of the work, we may remark with pleasure the appearance of the six pages of illustrations which precede the text, in which there is a display of skill, in what is really wood-engraving, not common in Chinese works. Some of the instruments represented are in tolerably correct perspective, and some are very well shaded. Wood-engraving, in our sense of the term, is an art which, as far as any degree of excellence is concerned, has yet to take its rise in China; we may therefore hail its incipient steps. The body of the work is printed from moveable leaden type, prepared at the station of the London Missionary Society in Hong-kong. The printing from these types is very clear and correct, and will compare favorably with good specimens of block-printing, or with the works printed at the Imperial press in Pih-king, from similar moveable type.* The book contains seventy-eight pages, (as we number them,) and will doubtless subserve an important end, as circulated among the more intelligent portion of the common people, and among the pupils of various schools under the care or supervision of missionaries.

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* As it may not be generally known that printing from moveable types has been long practised in China, the following extracts may not be without interest in this connection. They are from an article read before the French Academy by M. Stanislas Julien. See *Comptes Rendus*, etc., 7 Juin, 1847.

"M. Klaproth fait observer que l'imprimerie, originaire de Chine aurait pu être connue en Europe environ 150 ans avant qu'elle n'y fût découverte, si les Européens avaient pu lire et étudier les historiens persans. . . . . .

Nous ajouterons que l'Europe aurait pu connaître l'imprimerie 860 ans avant qu'elle ne fût découverte dans nos contrées, si quelques années avant le commencement du sixième siècle, elle eût été en relation avec la Chine. . .

L'usage de la gravure sur bois, pour reproduire des textes et des dessins, est, en Chine, infiniment plus ancien qu'on ne l'a cru jusqu'ici. Nous lisons, en effet, ce qui suit, dans l'encyclopédie Chinoise, *Kĕ-tchi-king-youen*, liv. XXXIX, fol. 2: "Le huitième jour du douzième mois de la treizième année du règne de Wen-ti, fondateur de la dynastie des Souï (l'an 593 de Jésus-Christ) il fut ordonné, par un décret, de recueiller les dessins usés et les textes inédits, et de les graver sur bois. Ce fut là, ajoute l'ouvrage que nous citons, le commencement de l'imprimerie sur planches de bois." . . . .

Suivant un autre recueil, intitulé *Pi-tsong*, l'imprimerie sur bois prit naissance dès le commencement du règne des Souï (581–618 de Jésus-Christ.)" . .

M. Julien goes on to speak of printing from engraved stones, and then proceeds to treat of the invention and use of moveable types. The whole article, which is too long to be here quoted in full, will repay examination. The chief points are as follows:

"On lit dans le *Mong-khi-pi-tan*, (liv. XVIII. fol. 8.) . . . . 'Dans le période *King-li* (entre 1041 et 1048 de Jésus-Christ) un homme du peuple (un forgeron, même ouvrage, liv. XIX, fol. 14) nommé *Pi-ching* inventa une autre manière d'imprimer avec des planches appelées *Ho-pan*, ou planches (formées de types) mobiles (cette expression s'emploie encore aujourd'hui pour désigner les planches de l'imprimerie Impériale qui se trouve a Péking.)" . . . .

Then follows the description of the manufacture of the types out of clay, moulded and baked: which was preferred to wood, as this swells when moistened by the ink. This invention was not followed up until:

"Sous le règne de l'Empereur *Kang-hi*, qui monta sur le trône en 1662 des missionaires Européens . . . . le décidèrent à faire graver 250,000 types mobiles en cuivre, qui servirent à imprimer une collection d'ouvrages anciens et moderns, qui forme 6000 volumes in 8°. . . . Cette édition peut rivaliser pour l'élégance des formes et la beauté de l'impression avec les plus beaux ouvrages publiés en Europe.

Il existe, dans le palais Impérial de Péking, un édifice appelé *Wou-ing-tien*, où, depuis 1776, l'on imprime, chaque année, un grand nombre d'ouvrages avec des types mobiles obtenus comme en Europe à l'aide de poinçons gravés et de matrices."

The second work is, as the title denotes, an Almanac with an appended scientific discussion. Though possessing so general a title, its object is, in connection with a calendar of the extent of those usually printed by missionaries every year, to explain the nature, the use, and the value, of the magnetic telegraph. The work has an English title-page, and an English preface. This preface sufficiently sets forth the author's main design in preparing the volume. I desire, in addition, to give a brief outline of the work, and an explanation of the plan which he proposes for conveying messages in the Chinese language, by means of the magnetic telegraph.

The work opens with both a general preface, or introduction, and a special one on the telegraph. Then follow six pages of plates, illustrating the appearance and use of Electric, Galvanic and Electro-Magnetic Machines, embracing some forty-five different figures. Then follow six chapters:

1st. Introductory, on Electricity generally;
2nd. On Electrical Machines;
3rd. On Galvanic Machines;
4th. On Magnetism;
5th. On Electro-Magnetism;
6th. On the Electric Telegraph, or, literally translated, "*the Electric Universal Signal.*"

The rest of the work is taken up with religious matter and the Almanac proper.

Of five of the above chapters it does not come within my design to speak. The sixth and last, however, contains some speculations worthy of attention. It opens with a description of the method of applying machines described in the previous chapters, to the purpose of transmitting messages. Then follows what I propose especially to examine, namely, the mode of employing the telegraph in respect to Chinese characters. The whole closes with an exposition of the value of such a means of communication to all classes in the community. Having derived his information and plans, as would appear from the English preface, exclusively from French works, the author seems to have been entirely ignorant of the improved methods which are alone employed in our country. His messages are in all cases to be communicated by means of an index, moving either from West to East, and *vice versâ*, or over a graduated, or lettered, dial. His plan, however, is only partially affected by this fact.

Before entering on his plan, it may be well to make some preliminary statements essential to a full understanding of it. Chinese characters, to a young student, or a casual observer, present a wilderness of marks, apparently entirely arbitrary in their disposal, and beyond the reach of any system that should clear up the construction of them. But a very little acquaintance with them will show that they are formed of a very limited variety of differing marks, or strokes, as they are usually termed. By Chinese authors, these marks are reduced to eight generic forms.

These are seen in the appended wood-cut (Nos. 2–9). The character *Yung* (No. 1) is said to combine them all. They are easily distinguished, unless 7 and 8 be thought to be the same; these strokes, however, are known by different names, and in their combination with the others cannot be interchanged. It is not necessary to point out their difference, as it would involve a tedious explanation, and require the introduction of several characters. Upon this division of all written characters into eight generic forms of strokes,* is based Dr. Mac Gowan's suggestion regarding the mode of transmitting messages.

By adding signs for *above, below, within, without, left, right, middle,* and *period* or *stop,* we have sixteen signals by which to convey the elements of every possible Chinese character. They are as follows:

(The signal is conveyed by a needle moving from East to West, or West to East, at the will of the operator.)

1 motion Eastward = above.
1 " Westward = below.
1 Eastward and 1 Westward = within.

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* It should be remarked, however, that, so minute has been the analysis of the written character, in some works that treat of penmanship, that these eight genera have given rise to no less than eighty-two species, each with a distinctive name, and fully illustrated. See Williams's *Easy Lessons in Chinese*, p. 60.

1 Westward and 1 Eastward = without.
2 Eastward = left.
2 Westward = right.
2 Eastward and 1 Westward = stroke No. 2 See wood-cut.
2 Westward and 1 Eastward = " " 3 "
2 Eastward and 2 Westward = " " 4 "
2 Westward and 2 Eastward = " " 5 "
3 Eastward and 1 Westward = " " 6 "
3 Eastward and 2 Westward = " " 7 "
3 Westward and 1 Eastward = " " 8 "
3 Westward and 2 Eastward = " " 9 "
3 Eastward and 3 Westward = middle.
3 Westward and 3 Eastward = period.

To give the character *Yung*, (No. 1,) we should then have the following signals:

1st. 1 Eastward = above.
2nd. 2 Eastward and 1 Westward = No. 2.
3rd. 2 Westward and 1 Eastward = " 3.
4th. 3 Eastward and 3 Westward = middle.
5th. 2 Westward and 2 Eastward = No. 5.
6th. 2 Eastward = left.
7th. 3 Eastward and 2 Westward = No. 7.
8th. 2 Westward = right.
9th. 3 Westward and 1 Eastward = No. 8.
10th. 3 Westward and 2 Eastward = " 9.
11th. 3 Westward and 3 Eastward = period.

Thus we have, for a very simple character of six strokes, eleven different signals: giving after all only the elements, and a very imperfect hint of the mode of combining them. But the question arises, how does this character stand as a specimen of the usual run of characters in Chinese? I have taken at random one column of characters, twenty in number, from the author's own work; they vary from two to twenty-three strokes each; the aggregate number of strokes is two hundred and eleven, or ten and a half to each, on an average. We should, then, have for each character an average of sixteen or seventeen distinct signals, (five being added as above,) and then the nice work of properly combining these marks thus given. We must conclude that, although the telegraph might transmit strokes with great rapidity, it would communicate characters and sentences at a rate by no means astonishing. We might doubt whether the ordinary modes of communication would not on the whole be preferable, except over very great distances.

But our difficulties do not stop here: there are some varieties of strokes which would inevitably require distinct signals, to the number of at least three, thus still farther encumbering the system. There are also in Chinese a large number, a majority in fact, of words which are compounded of two distinct parts; no provision is made for the transition from one of these parts to the other, the only reliance of the operator being upon the good sense and shrewdness of the one who receives the message, a reliance, which, if our experience in English goes for any thing, is very likely to be disappointed. There are also a large number of characters, of which I give a mere sample, (Nos. 10–13,) differing in points so slight that they are by beginners continually confounded. Those having the same number, as 10*a* and 10*b*, etc., etc., are by this system of communication to be represented by the very same signals, and no means is furnished for making the necessary distinctions.* The number of these similar looking characters is by no means trifling, as will be seen by examining the list prefixed to *Kang-hi's* Dictionary, and also given by Morrison in the Second Volume of the Second Part of his Dictionary. Although, therefore, much credit is due to Dr. Mac Gowan for the opening he has made, and the pains he has taken to draw out an explanation in Chinese, of this subject, he seems hardly to have hit upon a feasible mode of making it practical. He has apparently felt his difficulty, and has suggested, in his English preface, the employment of the Manchu alphabet; but why he chooses this, rather than the English, does not appear. The Chinese, as a body, know as much of the latter as of the former.

Having undertaken to show that a feasible mode of operation has not been pointed out, it remains for me to inquire if there may not be devised some simple and sure mode of proceeding. The question needs more study than it can well receive in this country; yet I would suggest one or two thoughts that naturally present themselves. At the outset it would seem exceedingly desirable, first, that some American form of the telegraph be substituted for that treated of by Dr. Mac Gowan: that we may thereby have more freedom of action; and secondly, that some more comprehensive signals be employed, with greater security against mistakes.

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* The necessity of distinction may however appear when we remember that 10*a* is *Heaven;* 10*b*, *Husband;* 11*a*, *Man;* 11*b*, *to enter;* 11*c*, *Eight;* 12*a*, *Noon;* 12*b*, *Ox* (*bos*); 13*a*, *Knife;* 13*b*, *Strength.* And so with great numbers of characters equally similar in form and equally diverse in signification.

We are obliged to start with one principle that must not be lost sight of: and that is, that no scheme can render a lexigraphic language as tractable for telegraphic purposes as an alphabetic one; and we shall not fail to find that more time, labor, and patience will be required in dealing with this system of writing than with any language like our own, resolvable into a very few elements.

Unable to decide on the comparative merits of different plans, I must mention two or three as briefly as possible. The famous Dictionary of *Kang-hi* has arranged all characters under 214 radicals, so called, the portion of the character connected with them being called the primitive: thus, in Nos. 14–17, if the last character (No. 17) be taken away from each of the others into which it enters as a primitive, we shall have three of the radicals represented as they appear, some of them being slightly modified by entering into composition. "The whole number of these primitives has been computed by Dr. Marshman at 3867, exclusive of the radicals. Of these, 2178 are of such rare occurrence, and in such unimportant words, that they may be rejected. There are then left 1689 primitives: to this number the 214 radicals must be added, (for the majority of them act also as primitives,) making a total of 1903 primitives. These, by combination with the 214 radicals, form at least seven-eighths of all the characters in the Chinese language, a proportion that for all practical purposes is fully equivalent to the whole." See Williams's *Easy Lessons,* pp. 32, 33.

Now, on the basis of House's patent,* a system might be formed by which the 214 radicals could be transmitted as our letters now are; and a list might be made out of the 1903 primitives, which could be appended by means of figures. For instance, suppose we wished to convey the character marked 14. We should have the primitive, say No. 67, (this number taken here at random,) while the radical (which is No. 120,) would be conveyed, not numerically, but, so to speak, bodily, and would be followed by the number 67. This primitive would be found at once by consulting the previously prepared list (the primitives being arranged according to the number of strokes). And so throughout. As, probably, 1000 primitives would occur in at least nine-tenths of the cases, an operator in constant practice would soon learn what primitives answered to certain numbers, and not be necessitated to consult the list, except in comparatively rare cases. To this plan it may be objected, that some radicals unite with their primitives in two or more different ways, and with different meanings: for instance, instead of being, as usual, on the left, the radical is found upon the top, or below. These cases are however rare, and the likelihood of their occurrence is not sufficient to affect the general plan, especially as the general context would be a great security against error. Another objection is found in the fact that in some characters the union of radical and primitive is hard to trace or define, and that some primitives among the rejected 2178 should have been retained. To this it may be said, that the few words of frequent occurrence, thus interfered with, might be inserted as individuals to the number of 97, before the list would reach 2000, a number not under the circumstances too cumbrous. Such is one plan not very complicated, considering that the language to be illustrated is this "oldest child of Babel."

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* In explanation of this plan, it may be well briefly to explain the operation of this form of telegraph, so far as here alluded to. Messages are on this plan printed on a slip of paper, from a wheel of hardened steel, on whose periphery are found the letters of the alphabet in bold relief: by the operation of the machine, the letters are at will brought strongly in contact with

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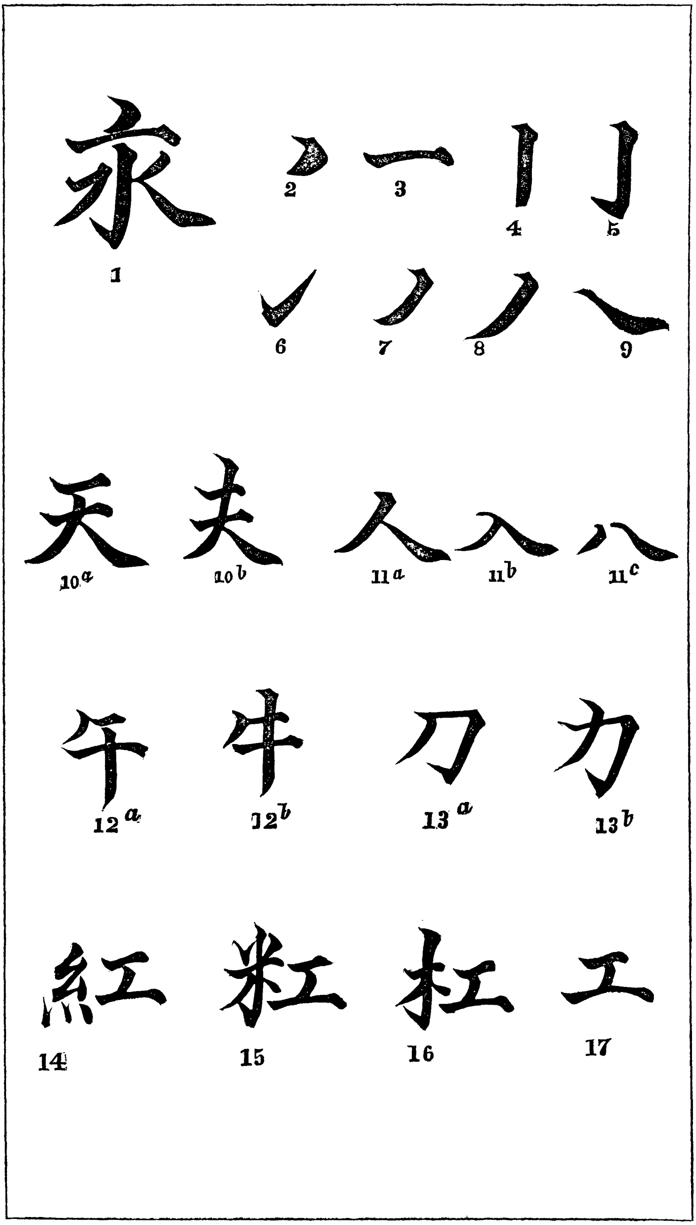
the paper, leaving an impression, letter following letter with immense velocity. Numbers are given in Roman, so that only the twenty-six letters and two other signs, e. g. for *stop*, *begin*, are required. In the Chinese instrument, we should require a wheel of nearly eight times the circumference required for the English, to contain the 214 radicals and 2 signals, the first ten radicals being also used for the numerals. The message is transmitted by touching keys like those of a piano, in English 28 in number; in Chinese there would of course be 216. The fact that with every touch of a key a *word* is transmitted, would justify the greater deliberation demanded by so numerous a collection of keys. Probably, however, a very short apprenticeship would render an operator capable of very rapid and yet accurate motions.

I might observe here that I have proposed to give the radicals bodily, and not their numerical representatives, in order not to have two independent sets of numbers: which however might easily be done.

Another plan would be to base the signals upon the sounds of the characters. In Williams's Vocabulary there are given, as appearing in the Court dialect, 533 syllables, which can all be distinguished by the letters of the English alphabet, and which include all the characters; now let some 7000, or 8000, or even more, common words be arranged according to their several sounds, and numbered: for example, under the sound *chi*, from 1–100, under *chu*, 1–100, and so on; the telegraph might then give the English spelling for the sound, and a number which, on reference, would give the particular word, e. g. (No. 14) *Hung* 3, or *Hung* 20, the number according to the list. Against this plan the objection lies, that it is founded on the sounds of the characters, which vary every hundred miles in any direction, and involves the introduction of English letters, with which the operators could be only imperfectly acquainted, and which they might not properly use. Still, time and practice would obviate all the latter difficulty, and the Court dialect might be made to give the standard of spelling.

Again, in Williams's *Easy Lessons*, the number of characters in common use is given as 3232: this number was determined by the examination of several classics by the Rev. Mr. Dyer of Malacca. If these characters, arranged in the order in which they occur in *Kang-hi*, were numbered throughout, they might be represented by the use of numbers alone. The objection to this is, that some time would be required to find the numbers, in the first place, and then to restore the characters, in the second place. This last plan is the most simple, would require the least complicated machine, and perhaps the least training on the part of the operator. If a message were to be transmitted in haste, it would however, probably, be most objectionable on account of the difficulty of speedily finding the character and its proper number.

Although there is no prospect that any speculations like the foregoing will be immediately brought into application, it may be well to follow them out, and thus exhibit the language of China in its capacity, or incapacity, to adapt itself to the march of human improvement. It is plainly a hard subject to manage; still, we may hope that this will not prove, at all events, an insurmountable barrier to the introduction, into that wide spread and populous empire, of this last signal triumph of human skill over human weakness. We may remark, before leaving the subject, that the Chinese language compensates in one respect for its inflexible characteristics, by the extreme condensation of expression of which it is capable. Owing to this, messages may be reduced to very few words, and thus the labor of transmitting them may be diminished, without creating confusion, or involving the danger of mistake.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10b
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13a
13b
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